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Hospital Employment and Local Unemployment:

Evidence from French Health Reforms

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Abstract

We here ask whether French local authorities respond to depressed local labour markets by increasing employment in State-owned hospitals. We use 2006-2010 panel data to examine within-hospital employment changes: higher local unemployment is associated with greater employment in State-owned hospitals, but not for any other hospital type. Our data cover a reimbursement reform introducing competition between hospitals. This reform reduced public-hospital employment, but had no overall effect on the relationship between public-hospital employment and local unemployment. Further analysis shows that this continuing relationship is only found in higher unemployment areas, where public-hospital employment remained counter-cyclical.

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1. Introduction

The scope for public intervention in markets is discussed all over the world (Le Grand and Bartlett 1993). Even after the large-scale privatisation undertaken in many European countries during the 1980s and 1990s, the public sector continues to represent a significant share (15-20%) of employment in most industrialised countries (Melly and Puhani, 2011). We here consider public-sector employment, from 2006-2010 panel data on the universe of French hospitals, and ask how this is related to local unemployment. We are able to exploit two features of French hospitals to identify a particular relationship between public-sector employment and local unemployment. First, there are three different hospital types: For-Profit, Not-For-Profit, and Public hospitals. Second, we appeal to a pro-competitive reform that was introduced for all hospitals in 2008.

Health and education are widely-provided by the public sector in many countries. However, the exact definition of what "public" means in terms of employment is not fixed and has changed over time. In European countries, the status of employees working in the public sector has changed from being civil servants to long-term contract employees. In particular, in Scandinavian countries this applies to the first years of teaching and research activities in the University and a growing number of health positions; in the UK, in hospitals with managerial autonomy many new employees are not civil servants. As a concrete example, the merger of two publicly-funded University hospitals in Stockholm, Sweden was managed by a Director hired under a private-contract, who had previously held senior management positions in private industry. The aim of this merger was to obtain a more efficient hospital with a balanced budget without reducing healthcare quality. This hybridisation of hospital staff types and the focus on economic efficiency has not come without conflict. In this particular case, protests escalated from clinical staff, and Division Heads began to seriously question the focus on economic efficiency and their Director's approach to running the hospital like a private company (Choi *et al*., 2011). This does however seem to be a global tendency in European countries, where historically publicly-owned hospitals have switched to being privately-run. A number of recent papers have

developed a method to quantify management practices in order to measure managerial quality across different firms (Jacobs *et al.*, 2006; Bloom and Van Reenen, 2007; Bloom *et al.*, 2010). Bloom and Van Reenen (2007) suggest that poor management practices are more prevalent in firms that are faced with weaker product-market competition.

The public sector has also evolved in France, and we here consider developments in the health sector. State-owned hospitals are run by a Director, who can now be recruited according to their CV, whereas a diploma from a specific school (*l'École des Hautes Etudes en Santé Publique*) was previously a prerequisite for a hospital Director appointment. With the managerial reform that was introduced as part of the HPST Law of July 21st 2009 (which came into force starting in 2010), the role of the hospital Director has changed to that of a manager, reflecting the shift of State-owned hospitals towards private-sector firms. This Law also restricted any potential links between public hospital employment and local political influence. The reform put an end to the rule that the local mayor systematically be the president of the establishment's Board of Directors; this latter has been replaced by an Advisory Board, the president of which, elected by the Board's members, may be a local politician but also some other competent person.

Somewhat earlier, the gradual introduction of the DRG-basis hospital-reimbursement reform[1] over 2004-2008 (called T2A in France) introduced competition across hospitals as an incentive for greater efficiency. In previous work on cross-section data from 1999 (Clark and Milcent, 2011), we found that public hospitals employ more staff than do non-public hospitals, conditional on size and the illnesses treated; we also found that this employment gap was systematically correlated with local unemployment. Our data here cover the universe of hospitals over the 2006-2010 period, which includes the full implementation of the DRG-basis payment-system reform in 2008 (but is almost entirely prior to the roll-out of the HPST reform). The question we ask is then whether the DRG reform has broken the link between State-owned hospital employment and the local unemployment rate. The introduction of this reform coincided with the 2008 financial crisis. It is also possible that this exogenous labour-market shock provided local political authorities with an additional incentive to use public-sector employment as a tool to mop up part of the associated rise in unemployment.

[1] Each hospital stay is associated with a Diagnosis-Related Group (DRG) , and each DRG is allocated a 'weight' depending on the average cost of the inputs (e.g. nursing, diagnostic services, procedures) required to achieve the appropriate patient outcome. The DRGs divide hospital cases (patients) up into around 700 groups, which contain similar pathologies requiring similar levels of hospital resource use. In a certain number of these pathology groups, patients are classified by four levels of severity (exploratory procedures are not categorised in this way). These DRGs and their weights differ from one country to another. There are around 2,200 French DRGs.

We use a fixed-effect model in panel data to control for hospital heterogeneity, and consider employment changes within-hospital. We compare the hospital employment to local unemployment relationship before and after the introduction of the pro-competition hospital reform. Our main result is that rising local unemployment is associated with greater employment in State-owned hospitals, but not in other hospitals. It was assumed that the introduction of the 2008 competitive reimbursement reform would reduce State-owned hospital employment: this is indeed what we find. However we also see that this reform had no overall effect on the relationship between State-owned hospital employment and local unemployment, although the exact details depend on local deprivation. In less-deprived areas, the reform worked as expected, with lower hospital employment and no correlation between local unemployment and State-owned hospital employment; however, in higher-unemployment areas, the former continues to hold but public hospital employment continues to be counter-cyclical.

The paper contributes to a growing literature on the effect of the political environment on secondary policy issues. Such secondary policy issues are defined as substantially affecting only small groups in society, typical examples being environmental policy, gun control, foreign aid, trade policy and unemployment policy. List and Sturm (2006) explore the extent to which such secondary policy issues are influenced by electoral incentives. They find that, in contrast to the popular view that secondary policies are largely determined by lobbying, electoral incentives have strong effects. Bloom *et al.* (2015) exploit political concerns over one particular policy, healthcare provision. They use the share of marginal political constituencies around each hospital as an instrument for the number of nearby competing hospitals. Politicians in the UK almost never allow hospitals in politically-marginal constituencies to close down, which produces greater hospital competition in areas with more marginal constituencies. Lizzeri and Persico (2001), Miles-Ferretti *et al*. (2002) and Persson and Tabellini (1999), compare majoritarian and proportional elections, and find that they lead to different levels and composition of public expenditure (which is due to different groups being targeted). We here consider the specific role of the local political authority in the employment policy of State-owned hospitals.

Our paper is also closely related to the literature on healthcare providers (Brekke *et al*., 2011, Chalkley and Malcomson, 2000, Ellis and McGuire, 1986, and Mougeot and Naegelen, 2008). One strand of this literature has focused on competition in healthcare (Gowrisankararan and Town, 2003, Propper, 2008, Shortell and Hughes, 1988, and Volpp and

Waldfogel, 2001). In recent years, policymakers in many countries have experimented with various ways of increasing the effective competition in healthcare in order to increase productivity. A mainly US literature has suggested that under certain conditions (regulated prices and observable quality) competition may improve quality (Kessler and McClellan, 2000) even if the consensus in the literature is not total. The effect of competition on mortality is likely to depend on the reimbursement rate (Shen, 2003). If hospitals are underpaid for patients with a given insurance, such as Medicare patients, they have little or no incentive to compete for them by improving quality. In the UK recent pro-competitive hospital reforms appear to have increased quality (Cooper *et al.*, 2011, and Gaynor *et al.*, 2013). Competition, by itself, has been shown to result in better hospital management (Bloom *et al.*, 2015).

Our work is particularly pertinent to the debate over the use of competition as a means of improving hospital productivity. It underlines the potential presence of other factors that may distort the link between competition and hospital productivity, independently of hospital efficiency.

Last, our paper contributes to the debate over publicly-regulated *versus* private markets. There has been a great deal of interest in recent years in competition in education, both theoretically and empirically (Epple *et al*., 2004, and Hoxby, 2000). The initial findings in this field were in favour of competition in education, although this conclusion has become more mitigated in recent work according to the context (Bayer and McMillan, 2005, and Rothstein, 2007).

The remainder of this paper is structured as follows. Section 2 explains the French context and the reform that took place up to 2008. The data are described in Section 3, and Section 4 presents the empirical results. Last, Section 5 concludes.

2. French hospital types and the introduction of competition

2.1 The French hospital system

In this paper, the term "hospitals" refers to all healthcare establishments with an acute care unit. As in many countries, France has both private- and public-sector hospitals. There are two broad types of the former, according to whether they are not-for-profit or for-profit. We shall refer to these three types as NFP, private and public, for simplicity. All of these three hospital types have a non-negligible share of the French healthcare market. As a rough

guide, considered in terms of full-time equivalent employees in the current data for the 2006-2010 period, public hospitals account for just over 80 per cent of this sector, with the corresponding figures for NFP and private being 6 and 12 per cent respectively.

The French National Health Insurance (the *Sécurité Sociale*) is a single-payer system: this eliminates any concerns about potential cost-shifting behaviour by providers, negotiation between providers and payers, or different reimbursement schemes for different patients. The reimbursements cover almost all medical services in hospital, except the additional fixed fee per day for catering and accommodation claimed by for-profit hospitals.

The difference between hospital types revolves around the selection of patients, hospital management, and way in hospitals are reimbursed for their activities by the *Sécurité Sociale*. We here consider the first two of these, and then turn to hospital reimbursement in Section 2.2 below.

The first difference is that private for-profit hospitals can choose who they treat; neither public nor NFP hospitals can select their patients. In terms of hospital management, staff status is similar in private and NFP hospitals, where staff are either self-employed (mainly the Doctors), salaried with a long-term contract, or salaried under a variety of short-term contracts.[2] On the contrary, public-hospital employees are either civil servants (which workers are very difficult to fire) or employed under the same variety of short-term contracts as above. These short-term contracts are restrictive in terms of the number of times they can be renewed; they in practice cover mainly lower-skilled workers. The government's aim here is to encourage establishments to transform these short-term contracts into long-term employment contracts in NFP and private hospitals, and into permanent civil service jobs in State-owned hospitals.

Public-hospital employment is determined by the hospital's Board of Directors, which latter includes local government representatives, and in particular the Mayor. The management of these hospitals is quite bureaucratic, with decisions following administrative procedures. Following a reform in 2005, public hospitals are supposed to have an Executive Council to improve the communication of decisions between the administrative and medical staff, including those relating to employment. The hospital's Board of Directors continues however to play the decisive role. It is important in the context of our paper to note that the Boards of Directors of private and NFP hospitals include neither local government representatives nor the Mayor, and decisions are more likely to be made jointly by the

[2]These different contracts were introduced successively by the government to try to reduce unemployment. They include the *contrat nouvelle embauche* (CNE) of 2005 and the four main types of *contrats aidés* between 2005 and 2009.

medical and administrative staff. Public hospitals had only little interest in attracting patients until the introduction of the reimbursement reform (2004-2008).

The particularity of the French system is therefore the presence of a particular type of private hospital: NFP hospitals which are managed like for-profit private hospitals but which are regulated (particularly in terms of not being able to turn patients away) like public hospitals.

In addition to the way in which they are run, the hospital reimbursement schemes are not the same across the three hospital types, and it is this that the authorities have sought to change *via* the introduction of more competition.

2.2 Hospital reimbursement and the introduction of competition

Reimbursement of hospitals in France depends only on hospital type and the illnesses treated. Hospital reimbursement progressively changed over the 2004-2008 period.

Prior to 2004, Public and NFP hospitals received a global budget, which was historically-determined and did not reflect hospital activity. Starting in 2004, a Payment-Per-Service system (widely known in the US as a Prospective Payment System - PPS) was progressively implemented in both NFP and public hospitals. In the PPS, the portion of these hospitals' budgets reflecting actual (previous year) activity as measured by French-DRGs rose over time from zero in 2003 to 10% in 2004, 25% in 2005, 35% in 2006, 50% in 2007 and 100% in 2008.

Private hospitals have always been paid on a fee-for-service basis. This fee differed from one region to another. With the reimbursement reform, private hospitals switched in 2005 from being paid by act to being paid according to the French-DRG. Figure 1 proposes a timeline showing the changes in the reimbursement scheme for different hospital types, and the hospital management reforms described above, as well as the period over which we observe hospitals.

The reimbursement scheme for all French hospitals can therefore now be summarised as follows.

- F is the total budget for all hospital activity, as voted by Parliament.
- The total number of French-DRG points in hospital i (French-DRG$_i$) is the weighted sum (also known as the cost weight) of all the activities that were carried out in the hospital in the previous year.

- The value of the point, *v* (which determines hospital reimbursement) is *F*/(sum of French-DRG$_i$ over all hospitals). This calculation of *v* ensures that the budget *F* is exactly spent.
- The reimbursement of hospital *i* is then given by French-DRG$_i$**v*.

So if a hospital carries out more activities (via care or surgery, for example) it will earn more as its DRG score will be higher; however, other hospitals will earn less as the value of the point falls.

The reimbursement is therefore now the same between all hospital types. The only difference between the sectors is the number of DRG points which are assigned to a particular intervention or care activity, which may be higher or lower in private compared to public or NFP hospitals. The system therefore now resembles a zero-sum game, where each hospital has an incentive to try to outdo the others. A hospital that maintains the same activity from year to year, while other hospitals increase theirs, will see its budget diminish over time. In addition, the abolition of the global budget for public and NFP hospitals ties their budget far more closely to their current activity, providing an incentive to attract patients.

2.3 Hospital employment and the labour market

Our previous work using 1999 cross-section administrative data showed that hospital employment in France is consistently higher in public hospitals than in NFP or private hospitals (Clark and Milcent, 2011). This holds even controlling for a number of measures of hospital output, such as the cost weight. By matching in local labour-market information, we were able to show that public-hospital employment was strongly positively correlated with the local unemployment rate. However, no such relationship was found in other hospitals. We concluded that our results were consistent with public hospitals providing employment in depressed areas.

The key potential issue with our 2011 results was that of unobserved heterogeneity. Hospitals employ more or fewer staff than each other because they do different things. Our cross-section results included controls for the number of beds, the number of patients, and the hospital cost weight. However, even with this detailed information on what hospitals do, we can always worry about omitted variables that are correlated with public-hospital activity and the local unemployment rate (which latter we cannot instrument successfully). One potential example might be local-area deprivation, the health effects of which are mainly felt in public

hospitals (and in a way that is not picked up by number of patients and cost weight). More generally, patient type and hospital type may be correlated in an unobserved way. For example, public hospitals may admit more low-income patients who require more low-skilled staff to follow-up after medical procedures, for a given pathology and level of severity.

In the current paper we have panel data, so that we can look at the relationship of hospital employment to local unemployment within the same hospital over time. As such, we avoid any problem of confounding unobserved time-invariant hospital characteristics: all of our results come from comparing the same hospital in different years.

In addition to this statistical advantage of panel data in factoring out unobservables, the main thrust of our paper is to exactly follow the introduction of competition between hospitals described in Section 2.1 above. One hypothesis is then that (relative to private hospitals, for which payment schemes have remained unchanged since 2005) public hospitals will have become progressively less reactive to local labour-market unemployment as competition rose between 2004 and 2008. We thus ask whether the different hospital types now look more similar to each other, in staffing terms. In other words, we should observe no correlation between local unemployment and hospital employment, whatever the hospital type. Furthermore, assuming that employment was "too high" in State-owned hospitals, as compared to the others, we should observe falling employment there over this period, and in particularly over the 2006-2008 period when the policy was being implemented.

In terms of the unemployment rate, this period was marked by the financial crisis, which began in 2008 with the Lehman scandal and the crash of the housing-market bubble. In the following period economic activity in the U.S. and many other countries declined significantly, with an associated rise in unemployment. In France, unemployment fell from 2006 to 2008 (from around 9% to 7.5%), but then rose to 9.1% in 2009 and 9.3% in 2010. This financial crisis coincided with the hospital-reimbursement reform (T2A) for NFP and State-owned hospitals. We may then think that the role of public hospitals in preserving employment became more salient during this period: we may then see a greater correlation between unemployment and hospital employment as the financial crisis unfolded.

The analysis of hospital staffing and local unemployment, across different hospital types, over this period will thus provide the econometric answer to this question. These results are presented below in Section 4. Before we do so, Section 3 describes the data used in our analysis.

3. Data

Our administrative data comes from the 2006-2010 SAE (*Statistiques Annuelles des Etablissements*) survey, which collects information on hospital staff and activities. We match in local-area information on the communal age distribution, unemployment and nationality from the 2006-2010 French Census. The unemployment rate used here is the unemployment rate in the municipality in which the hospital is situated. The data covers the universe of French hospitals.

The SAE includes information on hospital size (the number of beds and the number of annual admissions), and the type of care that is provided to patients. It also provides information on the number of staff in five different professional categories: administrative staff, support staff, medical staff, paramedical staff and Doctors. The support staff generally consists of unqualified workers, such as those working on buildings and grounds. Paramedical staff covers, for example, those providing social assistance to patients. This includes qualified and unqualified staff such as psychologists, physical therapists and dieticians and social service workers. The medical staff consists of Nurses (including Specialised Nurses) and nursing auxiliary staff. These five staffing groups differ notably by qualification level: the support staff being the least-qualified, and Doctors the highest-qualified. Nursing, paramedical staff and administrative staff include both qualified and unqualified workers. For example, some of the nursing auxiliaries do not have professional training (namely the ASH: "*agent de service hospitalier*").

The number of administrative, support and (salaried) medical staff in each hospital are calculated from readily-available information on hours worked to produce full-time equivalent figures. This figure is comparable between the three hospital types. The situation is less clear for Doctors, who are civil servants in public hospitals but are private-sector salaried or self-employed (*profession libérale*) in both NFP and private hospitals. In the latter, many Doctors are self-employed and are associated with a patient rather than a specific number of hours in the hospital. Calculating full-time equivalent figures for Doctors is not obvious. As Clark and Milcent (2011) show using cross-section data from the 1999 SAE, the number of Doctors employed in hospitals does not seem to be related to the local unemployment rate (conditional on the other explanatory variables), whatever the type of hospital ownership. Therefore, for the sake of simplicity, we do not do focus on this category of hospital staff here.

Our panel data allow us to control for all time-invariant heterogeneity between hospitals. However, the types of activity that hospitals carry out may potentially change over this five-year period, and help explain the change in employment in both State-owned and private (FP and NFP) hospitals: some of the jobs in all hospital types are short-term contracts, making employment fairly easy to adjust both upwards and downwards. We formally control for hospital activity via the cost weight, from hospital administrative records. Each hospital stay is associated with a Diagnosis-Related Group (DRG),[3] and each DRG is allocated a 'weight' depending on the average cost of the inputs (e.g. nursing, diagnostic services, procedures) required to achieve the appropriate patient outcome. The hospital cost weight is the sum of all the DRGs of the stays in the hospital over the year.[4] This index was first used in US; it is now also used in France where it is called the ISA ("*indice synthétique d'activité*"). One drawback of using hospital cost-weight data is that some observations are lost in the subsequent merge. We systematically check that our results are robust to the omission of the cost-weight variable. Our analysis below will also control for illness severity (as measured by the severity level of each DRG) and a number of local population characteristics (at the municipality level).[5]

Table 1 shows the mean number of hospitals observed per year, over our five-year period. These figures refer to the universe of French hospitals. Table 1 shows that hospitals are split roughly 50:50 between public and non-public status. Amongst the latter, just over 20% are NFP, while the rest are private. The standard deviations in column 2 are only small, as perhaps might be expected: the number of hospitals changes only little over time. These changes come about via new hospitals opening, existing ones shutting down, or mergers between units. In fact, it is the latter that has predominated. Table A2 in the Appendix shows that the total number of hospitals (and indeed the number of each type of hospital) has fallen monotonically over the period under consideration. There are 125 fewer hospitals in 2010 than in 2006, representing a fall of 7%.

Table 1 also presents hospital staffing levels. Public hospitals employ more staff than do private hospitals (not-for profit or for-profit). One natural explanation could be the hospital

[3]The DRG divides hospital cases (patients) up into around 700 groups, which contain similar pathologies requiring similar levels of hospital resource use. In a certain number of these pathology groups, patients are classified by four levels of severity (exploratory procedures are not categorised in this way). There are around 2,200 French DRGs.

[4]We should keep in mind that the cost-weight here reflects differences in "what hospitals do" within the hospital over the time period. Any average difference between hospitals in "what hospitals do" regarding type of treatment is already captured by the hospital fixed effects.

[5]The descriptive statistics of all of the variables used in the analysis appear in Table A1.

size. As is well-known, public hospitals are on average much larger than other hospitals, with just over 750 employees per hospital, as opposed to under 300 in NFP hospitals and just over 160 in private hospitals. Large research and teaching health establishments are by regulation public-sector in France. This larger average figure in the public sector does however mask a great disparity in the size of public hospitals. There are both many large public hospitals (including three agglomerated hospitals at the city level),[6] and at the same time a considerable number of small public hospitals. Considering as "small" hospitals with fewer than 75 employees, we find that 29% of private hospitals and 20% of NFP hospitals are small, but equally 23% of public hospitals.

We split hospitals up into four categories according to the number of admissions ((up to 5 000, 5 000-10 000, 10 000-16 000, and over 16 000), which are the size cut-points used by the French Ministry of Health in their hospital comparisons. Table A3 shows that all public research and teaching hospitals have over 16 000 admissions. As expected, total employment increases in the number of admissions. However, the rise in total employment with the number of admissions is steeper in State-owned than private hospitals.[7] Similar results pertain if we use the number of beds as the measure of hospital size. Even within size-class, Public-sector hospitals employ more workers than do their non-public counterparts, on average over the period (and by year).

The detailed structure of staff differs by hospital type, on average over the 2006-2010 period. Unqualified staff (namely support staff) represent 13% of employment in State-owned hospitals but between 8 and 6% in private hospitals (not-for-profit and for-profit).On the other hand, nurses represent 28% of State-owned hospital staff but 34% of staff in for-profit hospitals.

Figure 2 shows how hospital employment has changed over time. Here there is at first sight no evidence of any structural break in the employment series, which rise gradually over time. In particular, public hospital employment grew over the 2006-2010 period (by 8.5%). But so did employment in NFP and private hospitals (by 14.4% and 12% respectively). This might be thought to indicate some effect of the competitive reforms on employment in public hospitals. This is what we will evaluate in the next section.

[6]These three agglomerated multi-site hospitals are the APHP (*Assistance Public – Hôpitaux de Paris*), APHM (*Assistance Public – Hôpitaux de Marseille*) and HCL (*Hospices Civil de Lyon*). If we omit the three mega-units, average employment in public hospitals falls to a figure of around 660.

[7]This is most flagrant for the largest admissions category, but it also holds in the other size groups.

4. Results

The argument developed in Section 2 above suggested two potential elements affecting public hospital employment in the period of our data: *i)* a break in the correlation between local unemployment and hospital employment, due to the reform; and *ii)* a far less healthy labour market following on from the financial crisis (which could produce incentives for local job creation that trumped any dampening effect of the health reforms). The overall effect on public-hospital employment is then ambiguous and will depend on the relative size of these two phenomena. The relationship between hospital employment and local unemployment will arguably not be affected by the financial crisis, but will have been by the T2A reform (as discussed above). Were public hospital employment to have been too high in efficiency terms when the reform was introduced, we expect the competitive reform to yield a smaller or even zero correlation between employment and local unemployment in public hospitals. We will evaluate this empirically by the estimation of the coefficient on local unemployment in a public-hospital employment regression.

The regressions will also include year dummies. The estimated coefficients on these will reveal the time trend in employment in different types of hospitals. This movement over time will likely reflect the economic cycle and various reforms, but also other macro factors such as hospital technology and aging populations.

Our first simple regressions analyse the relationship between the log of hospital employment, the local unemployment rate, and four year dummies (with the first year, 2006, being the omitted category). Unemployment is calculated at the municipality level. As there are a few cases with more than one hospital of a given type within the same municipality, the standard errors in all regressions are clustered at the municipality level. We run regressions separately for each hospital type. These are linear regressions with hospital fixed effects: as such, the effect of local unemployment on hospital staff is identified solely by seeing how employment within a given hospital changes with the evolution of the local unemployment rate. No between-hospital information is used in the estimation of these coefficients.

We introduce the local unemployment rate in levels, rather than logs. One reason for doing so is that the data prefer a log-level to a log-log specification (in the sense that the R^2 statistic is higher in the former). A second reason is that using the log of the unemployment rate compresses the variation in high-unemployment areas, and it is exactly this variation that we wish to exploit. It should be noted that all of our results do continue to hold in log-log specifications. We have also checked for the influence of outliers by ensuring that all of the

results below are robust to the omission of the three very large central hospitals in our data (and more generally to the omission of research and teaching hospitals).

The results from these simple regressions appear in Table 2. The local unemployment rate is positively correlated with employment in public-sector hospitals. Columns 2 and 3 of Table 2 then carry out the same analysis for NFP and private hospitals respectively. Here we find no significant employment correlation with the local unemployment rate. The estimated coefficient in column 1 predicts that a one percentage-point increase in local unemployment will produce a 1.26% rise in employment in public hospitals (since exp(.0125) = 1.026).[8]

The relationship highlighted in Clark and Milcent (2011) between public-hospital employment and local unemployment in cross-section data then continues to hold in panel data (i.e. within-hospital), suggesting that the previous cross-section results were not overly-biased. This interpretation is reinforced by the absence of any unemployment effect on NFP employment. NFP hospitals have the same reimbursement rules as do State-owned hospitals, but local authorities have no power to determine hospital employment there. Staffing in public hospitals can then be viewed as a tool to counter local labour-market difficulties.

The estimated coefficients on the year dummies are of interest here. These reveal continuing employment growth in NFP hospitals, and an essentially flat time profile in private hospitals. However, there does seem to be evidence of some kind of break for public hospitals, with employment higher in 2007 and 2008 than it was in 2006, but then lower in the last two years. This may be thought to be correlated with the complete application of the new reimbursement rules in 2008 for public hospitals.

Table 3 explicitly introduces the date of the reform, by interacting local unemployment with two time dummies: one for the period before the reform was fully implemented (2006-2008), and another for the post-reform period (2009-2010). As the goal of this reform was to make public sector and non-public sector hospitals more similar, we might expect the coefficient on local unemployment to be reduced after 2008. The question we pose here is then whether the reform has managed to break the link between State-owned hospital employment and local unemployment: have public hospitals become less Keynesian?

[8]As noted in Section 3, there are somewhat more small hospitals in the public sector than in the other sectors. To be sure that hospital size was not driving part of the results in Table 2, we split the sample by hospital type into large and small groups (as defined by a threshold of 10 000 admissions per year: which is the definition used by the French Administration). We find essentially the same positive and significant estimated coefficient on log unemployment in large and small public hospitals. Log unemployment remained insignificant in the other four regressions.

The results show no evidence of such an effect. The role of local unemployment continues to hold post-reform with an estimated coefficient that is significant at the 1% level. The estimated coefficients on the year dummies in Table 3 are very similar to those in Table 2.

One interpretation of this continued relationship is that the link between employment and the local labour market in State-owned hospitals is larger in times of high unemployment. As a test, we appeal to the cross-section variation in unemployment. We split our sample according to whether the local unemployment rate is above or below the median level in our sample (which turns out to be 10%[9]), and run panel regressions as in Table 3. The results in Table 4 show that for State-owned hospitals in municipalities with below-median unemployment, the estimated unemployment coefficient is barely significant pre-reform (significant at 13%) and totally insignificant post-reform. Any link between employment and the local labour market in public hospitals has then totally disappeared after the reform in better-off areas.

On the contrary, in "high-unemployment" municipalities, the coefficient on unemployment is positive and significant for public hospitals both pre- and post-reform (with the latter coefficient being a little larger than the former). A plausible interpretation is then that public hospital employment is used more intensively as a labour-market policy tool in slack labour-market conditions.

However, this does not mean that the T2A reform ended up having no effect on hospitals. In Table 4, as in our other regression tables, the year dummies are significantly negative in 2009 and 2010 for public-hospital employment, but not for the other hospital types. It is tempting to read these as reflecting the reform: faced with greater competition, the trend in public hospital employment became negative, even though it continued to react to local unemployment. This reform effect (as shown by the year dummies) is far larger in more deprived municipalities.

We next consider Table 3's specification estimated separately by employee qualifications. The link from State-owned hospital employment to local unemployment appears for low- to medium-qualified employees in Table 5 (as in Clark and Milcent, 2011). Equally, the negative time trend in public hospital employment (conditional on the other

[9]Which is not the same as the INSEE national figures that we described above. Hospitals are not randomly-distributed across the territory, and we do not weight by the size of the commune when we calculate the median. The actual value of median unemployment in these municipalities is 9.7%.

control variables) only took place for these low- to medium-skill employees. There is no evidence of any time trend in the employment of high-skill workers in any type of hospitals.

Our regressions so far have not included time-varying within-hospital variables. We might worry about there being more health demand as local unemployment rise. Table 6 includes a number of such variables. One of these is the hospital cost weight (as described in Section 3), which picks up the different types of patient (in terms of illness gravity) appearing in a given hospital in different years. The regressions also control for the percentage of each level of illness severity admitted in hospital, the presence of an emergency unit, the number of beds (which is quite stable over the period) and the number of patients admitted, the percentage of day-surgery and the percentage of sessions (such as chemotherapy-sessions, for instance). The local demand for health is picked up by the municipality fixed effects, which are multicollinear with the hospital fixed effects. The standard errors continue to be clustered at the municipality level.

Table 6 displays the results after controlling for time-varying within-hospital variables. The results here can be compared to those in Table 3, which does not include these variables. There continues to be a significant effect of local unemployment on public hospital employment in Table 6. For NFP hospitals, which are reimbursed like public hospitals, there remains no effect, as is the case also for FP hospitals. The employment trend for State-owned hospitals is still negative, with no trend for the other hospital types. NFP and FP hospitals are then similar in terms of employment trend and there being no employment correlation with the local unemployment rate. On the contrary, the reform does seem to have changed the employment behaviour of State-owned hospitals, with a clear fall in employment post-reform. However, in the context of the financial crisis, we find no evidence that the T2A reform has changed employment behaviour with respect to local unemployment. The answer to the question of whether the reform has managed to break the link between public-hospital employment and local unemployment is "No, but". The reform does seem to have reduced public-hospital employment, but has not touched its local cyclical nature.

5. Conclusions

We have here used five years of panel data on the universe of French hospitals to evaluate the effect of pro-competitive reforms regarding hospital reimbursement. We ask first whether these reforms changed hospital employment, and then whether they affected the

relationship between hospital employment and local unemployment previously observed in public-sector hospitals.

In the first sense, the DRG-basis payment reform to the French hospital system "worked". The downward post-reform employment trend we find in State-owned hospitals is not observed in other hospital types (NFP hospitals and FP hospitals): different hospital types have converged in an employment sense.

However, if this reform was meant to have blurred, or even removed, the distinction between the health and large local employer roles of public hospitals, then it seems to have failed. Public hospitals show no sign of reacting less to local unemployment after the introduction of the reform. The fact that this continuing relationship is only found in higher unemployment areas suggests that in times of labour-market crisis, local politicians are able to continue to exert pressure on the hiring behaviour in public hospitals. In this context, it will be of interest to see whether the HPST reform that started in 2010, which aimed to dilute the power of local politicians in hospital management, affects the way in which hospitals react to local unemployment.

Much has been made of the comparison of the efficiency of different sectors of the economy: Is the private sector a more efficient provider of some goods and services than the public sector? The first difficulty in making such comparisons is the measurement of output, as the public sector is often present in areas where the measurement of output or value-added is not obvious. This is for example the case in education (where it is not a paper certificate or simple years spent in school) and health (which is not only being alive on discharge, but a more general measure of quality of life following treatment).

The second issue is that of standardising the inputs that are used to determine the output. One key question here concerns selection. Private schools may obtain better education outcomes, but they do not admit the same pupils as State schools, making it hard to carry out the comparison of like with like. Equally, in the domain examined here, it is easy to imagine that some health providers will cherry pick their patients, leaving those who are deemed to be difficult or expensive to treat to the residual health claimant: public-sector hospitals.

The third point, which is at the heart of what we have discussed here, concerns the perhaps intractable question of what is meant by efficiency in a social-welfare sense. What is it, as a society, that we would want hospitals or schools to do? A purely health-provision point of view is that hospitals should be efficient, in the sense of producing the best-quality healthcare for a given set of inputs.

However, hospitals do not operate in a vacuum, and other prerogatives may come into play. In particular, one of the main inputs that hospitals use is labour, and society may have preferences over the level of unemployment. A hospital can reduce local unemployment by hiring more staff, producing a positive societal externality. Our main point here is that those who manage public hospitals may well internalise this externality more than will those who manage private hospitals. We therefore expect public hospitals to hire more staff in response to higher unemployment than private hospitals.

We can have diverse beliefs about whether this hiring difference is valuable. One point of view is that the public sector by doing so spends public money to create little in terms of extra output, and crucially little in terms of lower unemployment (as it crowds out the private sector). Towards the other end of the spectrum, we may consider that the negative externalities from unemployment (and therefore the positive externalities from employment) are of considerable magnitude, and we may also think that extra staff produce noticeably better healthcare (which, as noted above, is notoriously difficult to measure). This is therefore a Keynesian employment policy, but one which produces a far more socially-valuable output than digging holes.

An additional point to be considered in this respect is the type of job and contract that public-sector hospitals use to increase employment. Private-sector firms can flexibly hire and fire workers with long-term contracts; however, public-sector hospital employment flexibility is achieved via different types of short-term contract. One potential drawback is that little human capital is created in these short-term positions, with potential knock-on effects on hospital efficiency.

We cannot settle this argument here. The private sector may well produce the same output with less employment. But the greater employment in the public sector may also yield positive societal spillovers. Those who decide on the level of employment in private hospitals have less incentive to take this externality into account. Competition here may then run the risk of increasing productive efficiency but reducing social welfare.

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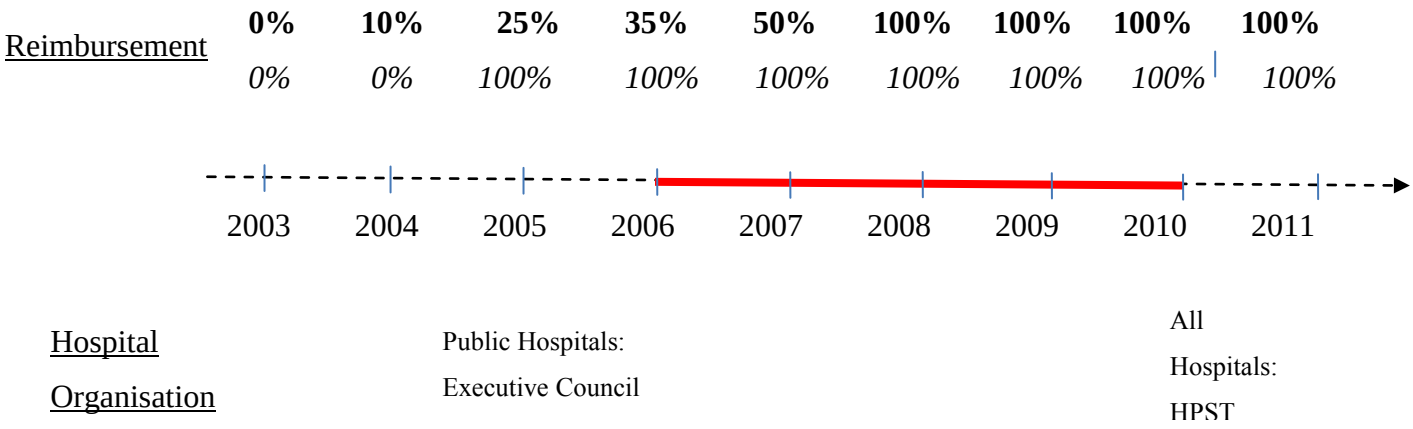
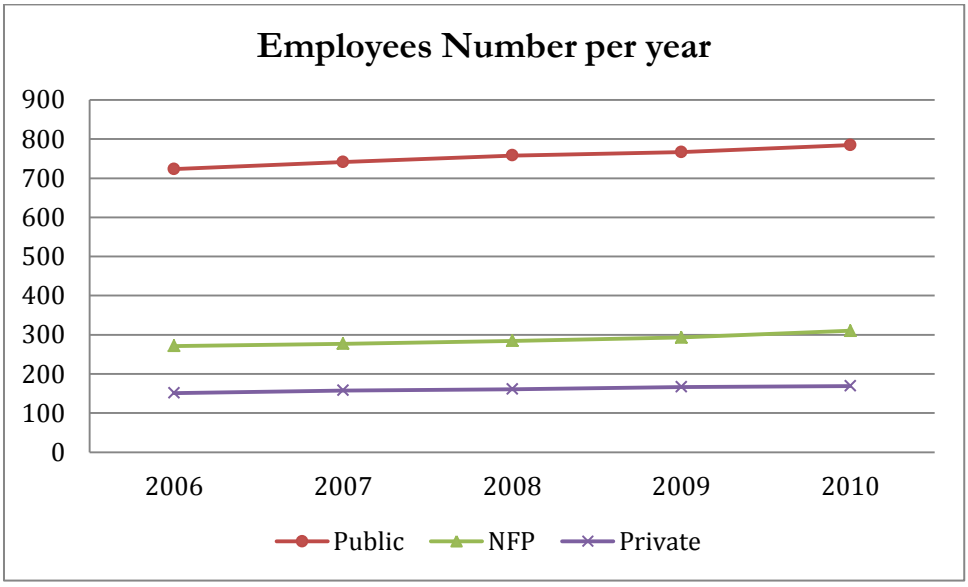
Figure 1. **Timeline of Reforms and Data**



Notes: In the top panel, the bold figure refers to the percentage of budget reimbursed according to payment-per-service in **public and NFP hospitals**, and the italic figure to the same percentage in *private hospitals*. The red period on the time line corresponds to our data.

Figure 2. **Number of employees by year and hospital type**



Note: Number of employees measured in FTEs.

Table 1. **Descriptive statistics**

Hospital type	No. of hospitals (mean per year), rounded	Std. Dev.	No. of employees (mean)	Std. Dev.	Minimum	Maximum
Public	886	21.4	754.1	2829.0	16.1	76527.1
NFP	181	3.7	287.0	303.0	8.3	1868.6
Private	628	21.5	161.0	142.6	6.7	1712.5

Note: Data from the DREES (Ministry of Health). 2006-2010 (5 waves)

Table 2. **Log employment and local unemployment: Panel results**

	Public	NFP	Private
Unemployment rate (%)	0.0125***	0.00475	0.00175
	(0.00353)	(0.00498)	(0.00359)
2007	0.0325***	0.0257**	0.0152
	(0.00847)	(0.0126)	(0.0106)
2008	0.0254***	0.0370***	0.0108
	(0.00794)	(0.0117)	(0.00930)
2009	-0.0533***	0.0483***	0.0178*
	(0.0108)	(0.0148)	(0.0102)
2010	-0.0642***	0.0656***	0.0171
	(0.0121)	(0.0178)	(0.0129)
Constant	6.091***	5.000***	1.492***
	(0.0200)	(0.0400)	(0.0743)
Observations	4427	906	3,137
Number of hospitals	928	208	716

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions include hospital fixed-effects

Table 3. **Log employment and local unemployment: pre- and post-reform**

	Public	NFP	Private
Unemployment rate (%) prior to the reform (2008)	0.00654*	0.00811	-0.000165
	(0.00383)	(0.00573)	(0.00421)
Unemployment rate (%) after the reform (2008)	0.0115***	0.00588	0.000923
	(0.00349)	(0.00496)	(0.00367)
2007	0.0271***	0.0287**	0.0132
	(0.00837)	(0.0134)	(0.0105)
2008	-0.0218	0.0584**	-0.000473
	(0.0161)	(0.0275)	(0.0157)
2009	-0.0991***	0.0677**	0.00787
	(0.0178)	(0.0271)	(0.0150)
2010	-0.110***	0.0846***	0.00749
	(0.0188)	(0.0292)	(0.0165)
Constant	6.132***	4.973***	1.503***
	(0.0249)	(0.0477)	(0.0777)
Observations	4420	905	3,136
Number of hospitals	928	208	716

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions include hospital fixed-effects

Table 4. **Log employment and local unemployment: above and below median unemployment municipalities**

	Local unemployment: Below median			**Local unemployment: Above median**		
	Public	NFP	Private	Public	NFP	Private
Unemployment rate (%) prior to the reform (2008)	0.00625	0.0127	0.00389	0.0127**	0.00587	0.00105
	(0.00417)	(0.0155)	(0.00734)	(0.00602)	(0.00895)	(0.00630)
Unemployment rate (%) after the reform (2008)	0.000282	0.0150	-0.00202	0.0169***	-0.00418	0.00273
	(0.00814)	(0.0138)	(0.00753)	(0.00528)	(0.00769)	(0.00533)
2007	0.0188	0.0353	0.0180	0.0280**	0.0239	0.0201
	(0.0114)	(0.0223)	(0.0123)	(0.0141)	(0.0170)	(0.0200)
2008	-0.0222	0.0170	0.0489	-0.0190	0.162***	-0.00755
	(0.0403)	(0.0517)	(0.0315)	(0.0357)	(0.0567)	(0.0385)
2009	-0.107**	0.0382	0.0528	-0.0823**	0.177***	0.00592
	(0.0440)	(0.0500)	(0.0339)	(0.0364)	(0.0579)	(0.0368)
2010	-0.127***	0.0280	0.0688**	-0.0923**	0.213***	-0.00394
	(0.0452)	(0.0518)	(0.0344)	(0.0368)	(0.0595)	(0.0397)
Constant	6.194***	4.937***	1.475***	6.015***	5.961***	5.459***
	(0.0450)	(0.118)	(0.0817)	(0.0769)	(0.0957)	(0.0687)
Observations	2,346	444	1,440	2,074	461	1,696

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions include hospital fixed-effects. The median unemployment rate across municipalities is 9.73%.

Table 5. **Log employment and local unemployment: level of employee qualification**

	Very low-qualified			**Low-qualified**		
	Public	NFP	Private	Public	NFP	Private
Unemployment rate (%) prior to the reform (2008)	0.114***	0.0313*	-0.00613	0.0961***	0.00769	0.00390
	(0.0114)	(0.0165)	(0.00693)	(0.00813)	(0.0147)	(0.00679)
Unemployment rate (%) after the reform (2008)	0.119***	0.0123	-0.00121	0.0973***	-0.00981	0.00573
	(0.00777)	(0.0118)	(0.00520)	(0.00583)	(0.00999)	(0.00536)
2007	0.152**	0.0794	0.0427	0.0957*	0.0359	0.0323
	(0.0766)	(0.138)	(0.0550)	(0.0580)	(0.115)	(0.0558)
2008	0.0832	0.253	0.0243	0.0347	0.221	0.0164
	(0.146)	(0.251)	(0.105)	(0.107)	(0.211)	(0.108)
2009	-0.0930	0.267	0.0624	-0.140	0.250	0.0206
	(0.152)	(0.262)	(0.111)	(0.113)	(0.218)	(0.114)
2010	-0.103	0.340	0.0799	-0.0390**	0.310	0.00931
	(0.154)	(0.262)	(0.113)	(0.0176)	(0.219)	(0.118)
	Medium-qualified			**High-qualified**		
	Public	NFP	Private	Public	NFP	Private
Unemployment rate (%) prior to the reform (2008)	0.0788***	0.0252	0.00755	0.000368	0.0269***	0.00791**
	(0.00912)	(0.0166)	(0.00609)	(0.00283)	(0.00896)	(0.00309)
Unemployment rate (%) after the reform (2008)	0.0772***	0.00970	0.00548	0.00139	0.0214***	0.0110***
	(0.00642)	(0.0117)	(0.00415)	(0.00189)	(0.00632)	(0.00200)
2007	0.120*	0.0408	0.0432	-0.0109	-0.0373	-0.161
	(0.0652)	(0.147)	(0.0425)	(0.0182)	(0.0648)	(0.114)
2008	0.0867	0.194	0.0399	5.34e-05	-0.0754	-0.00693
	(0.120)	(0.255)	(0.0840)	(0.0388)	(0.127)	(0.0397)
2009	-0.106*	0.205	0.0897	0.250	-0.0268	-0.0259
	(0.0589)	(0.264)	(0.0870)	(0.262)	(0.127)	(0.0418)
2010	-0.143***	0.137***	0.0722	0.0698	-0.00412	-0.0479
	(0.041)	(0.0400)	(0.0890)	(0.127)	(0.128)	(0.0466)

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions include hospital fixed-effects. The very low qualified are low-skilled manual workers; low-qualified includes some administrative and medical support staff; medium qualified includes Nurses and higher-level administrative staff; and high-qualified covers Doctors and midwives. Self-employed Doctors are assumed to count for 50% of a full-time equivalent

Table 6. **Log employment and local unemployment: adding control variables**

VARIABLES	Public	NFP	Private
Unemployment rate (%) prior to the reform (2008)	0.0120***	0.0024	0.000669
	(0.00350)	(0.00955)	(0.00482)
Unemployment rate (%) from the reform (2008)	0.0138***	0.00202	0.00240
	(0.00315)	(0.00638)	(0.00423)
2007	0.0265***	0.0248*	0.0203**
	(0.00834)	(0.0134)	(0.00957)
2008	0.000103	0.0389	0.00461
	(0.0149)	(0.0264)	(0.0176)
2009	-0.0660***	0.0250	0.00796
	(0.0158)	(0.0272)	(0.0173)
2010	-0.0707***	0.0276	0.00421
	(0.0166)	(0.0286)	(0.0180)
Log Number of Beds	0.0570***	0.155***	0.113***
	(0.0189)	(0.0333)	(0.0141)
Log Admissions	0.0518***	0.0380***	0.0144***
	(0.0191)	(0.0114)	(0.00517)
% Low severity	REF	REF	REF
% Moderate severity	0.0676	-0.231	-0.183
	(0.103)	(0.210)	(0.213)
% Severe severity	0.195	0.369*	0.783**
	(0.119)	(0.219)	(0.375)
% Acute severity	0.772***	-1.003	-0.257
	(0.295)	(0.657)	(1.270)
Emergency Unit	-0.0712	0.0311	-0.00851
	(0.0444)	(0.0608)	(0.0367)
% Day-surgery	0.1065***	-0.00123	-0.305***
	(0.0291)	(0.254)	(0.111)
% of Sessions	0.162	0.0244	0.00376
	(0.118)	(0.127)	(0.124)
Cost Weight	2.47e-09***	1.12e-08***	7.31e-09***
	(8.06e-10)	(3.87e-09)	(2.76e-09)
Constant	5.842***	4.046***	1.652***
	(0.192)	(0.228)	(0.205)
Observations	3,238	619	2,882
Number of hospitals	714	147	643

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions include hospital fixed-effects

Appendix Table A1

	No. Of observations	Mean	Std. Dev.
No. Employees	8470	484.5	2069.03
No. Nurses	8470	261.4	1120.84
No. Support staff	8470	105.5	384.89
No. Administrative staff	8470	75.1	326.16
No. Paramedical staff	8470	42.5	244.67
No. of Beds	8470	131.9	390.72
	8470	(median: 62)	
No. of Admissions	8470	7275.5	18967.77
% Illness: low Severity	8470	69.9%	0.11
% Illness: moderate Severity	8470	19.1%	0.10
% Illness: high Severity	8470	9.0%	0.09
% Illness: very high Severity	8470	2.1%	0.02
Emergency	8470	27.3%	0.45
Cost Weight	6780	1.56E+07	4.21E+07
Local Unemployment Rate (/100)	8461	10.3	4.26
Median Municipality Income	8470	14268.0	3176.86
Municipality Death Rate (/100)	8470	1.1%	0.01
Local % Foreign-Born (/100)	8470	6.4%	0.04
Local % Aged 60-74 (/100)	8470	14.1%	0.03
Local % Aged 75+ (/100)	8470	9.5%	0.04

Note: The last six lines in this table refer to the unweighted average figures across municipalities in which there is a hospital.

Appendix Table A2. **Hospital numbers by year and hospital type**

Hospitals	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
Public	909	906	889	871	852	4427
NFP	187	182	182	179	176	906
For-Profit	663	638	623	607	606	3137
Total	1759	1726	1694	1657	1634	8470

Appendix Table A3. **Employment staff and hospital type (2006-2010 average)**

	Public	NFP	Private
< 5000 Admissions	131.2	135.2	85.5
	N=557	N=113	N=377
5000-10 000 Admissions	501.4	383.4	211.5
	N=90.6	N=41	N=165
10 000-16 000 Admissions	790.1	693.0	371.3
	N=74	N=21	N=65
> 16 000 Admissions	2984.3	1030.1	472.8
	N=165	N=6	N=21